Jan. 5, 1954 J. D. BETHEA 2,664,928

AUTOMATIC PORTABLE SAWMILL

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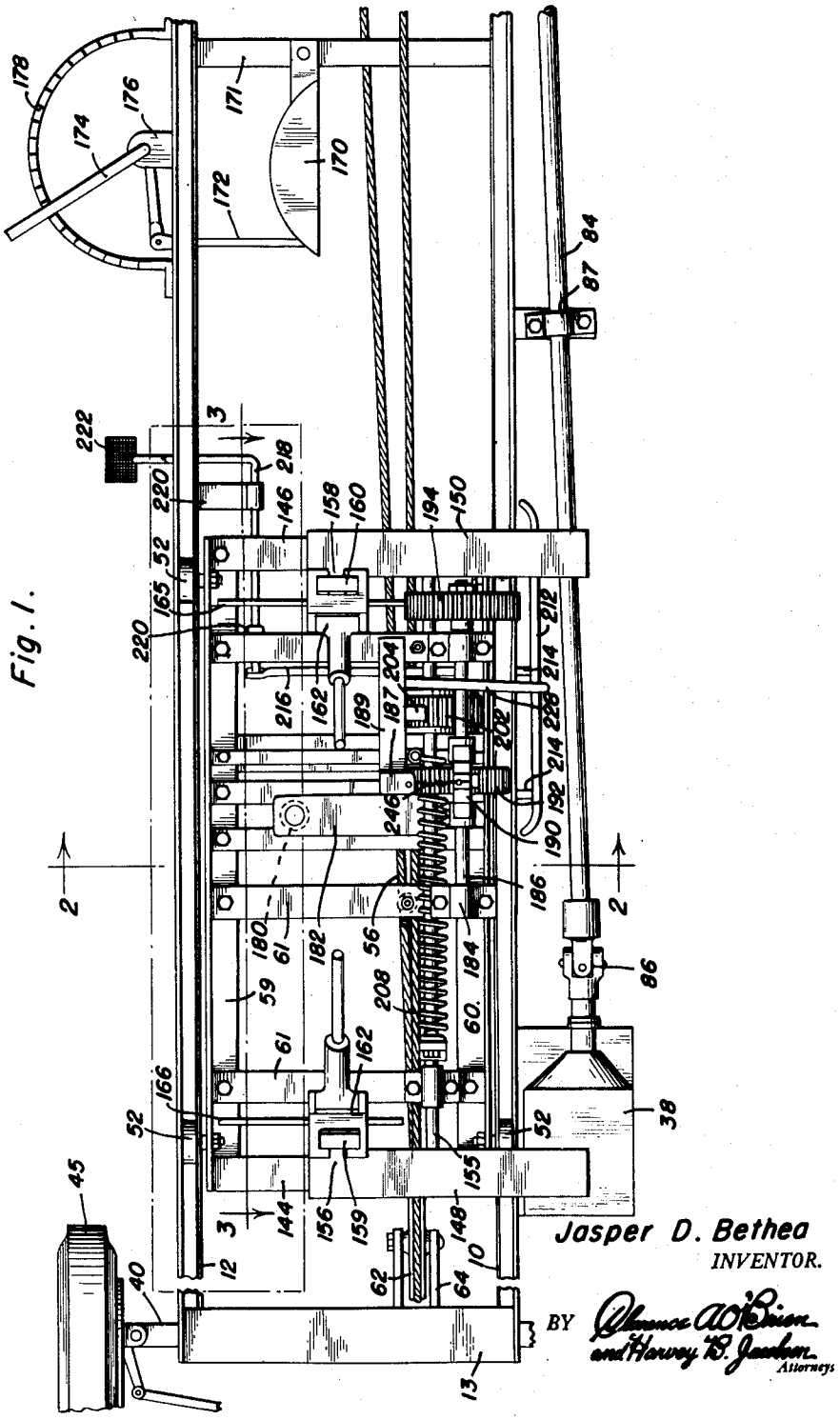


Fig. 1.

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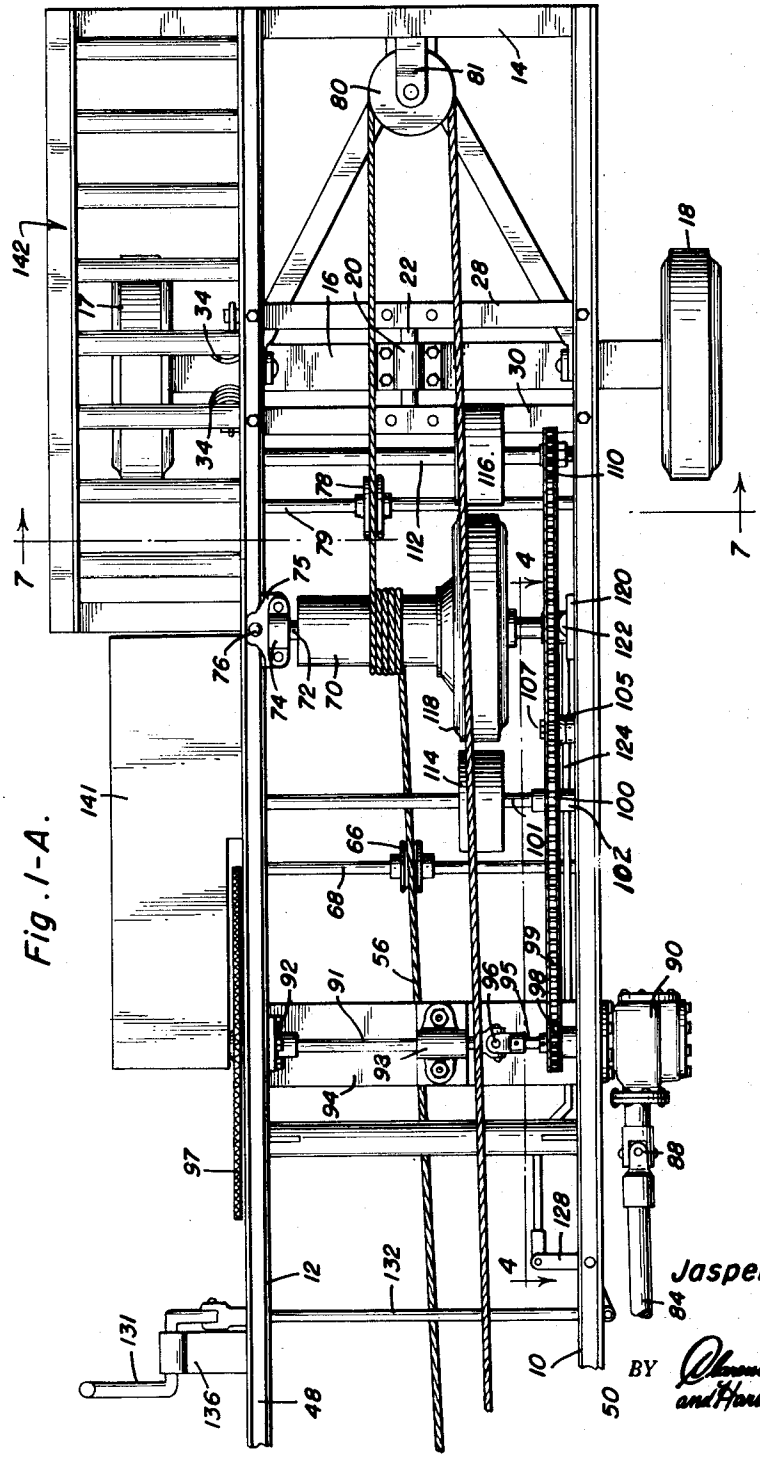


Fig. 1-A.

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Fig. 2.

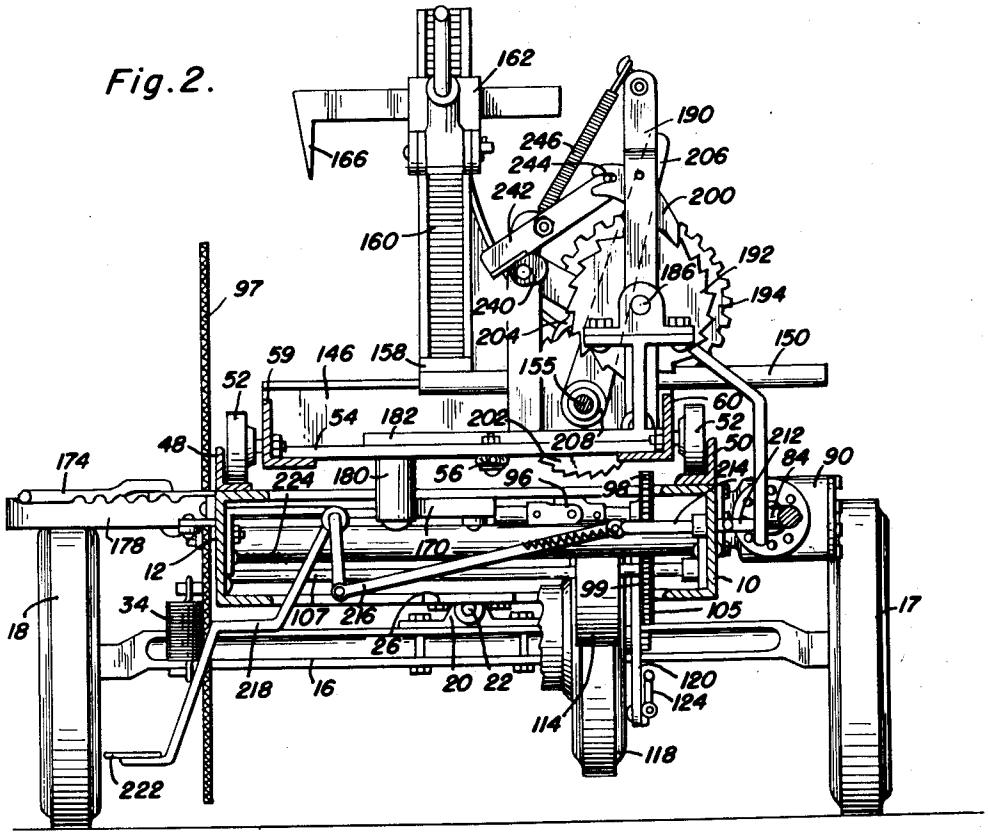
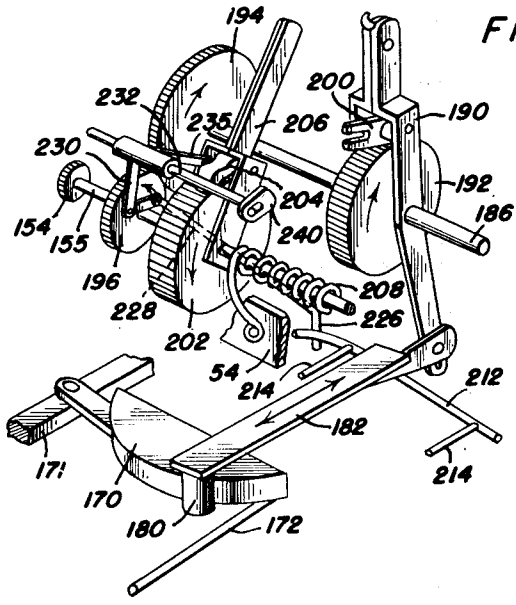


Fig. 5.



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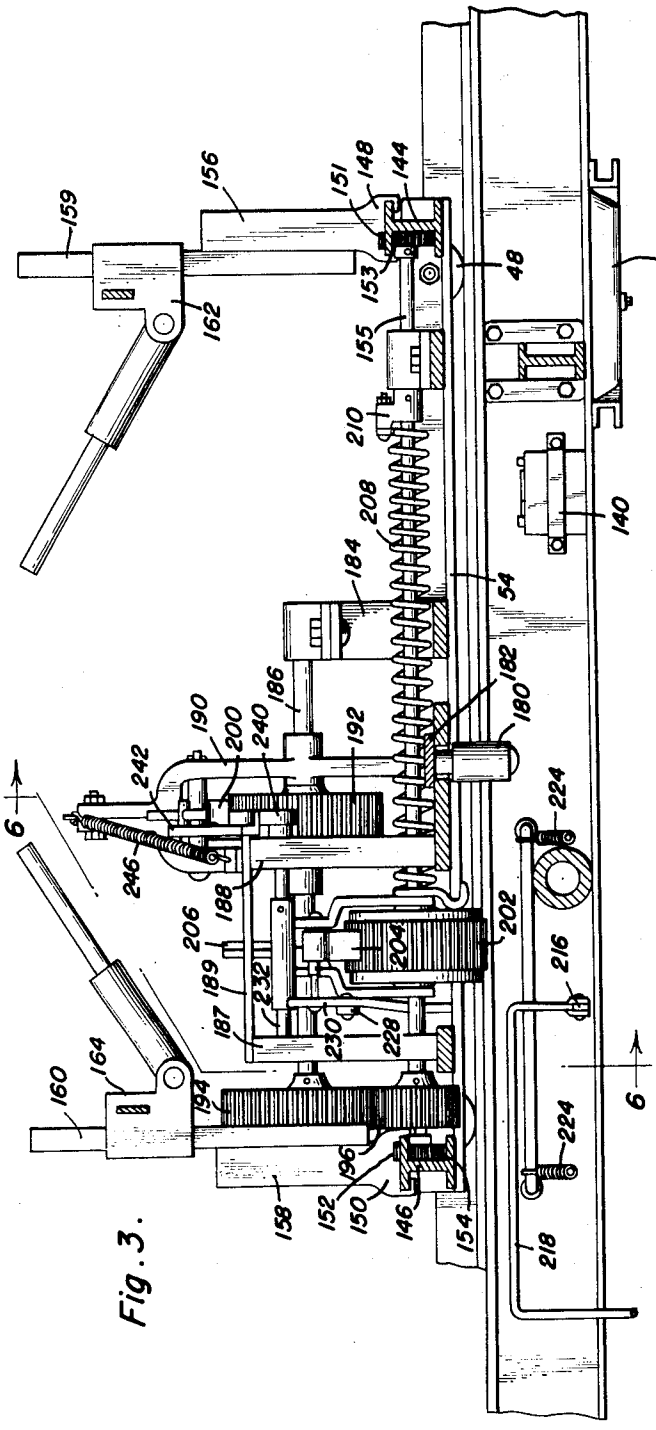


Fig. 3.

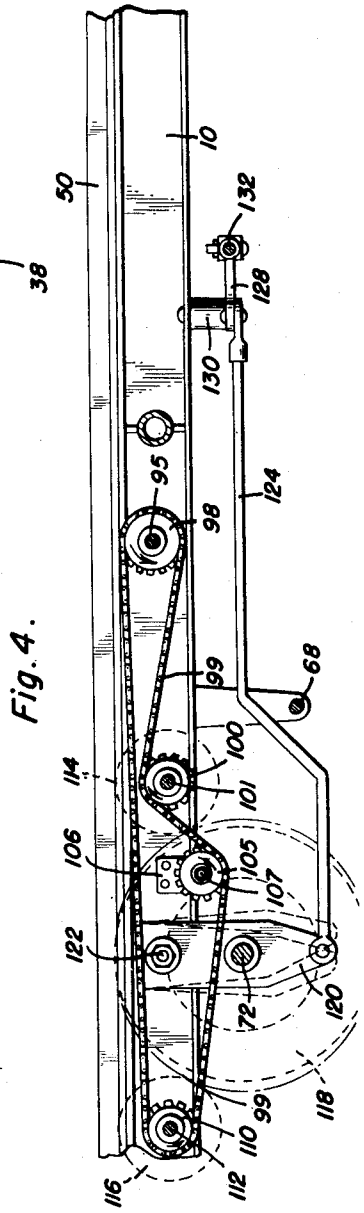


Fig. 4.

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Fig. 8.

Fig. 6.

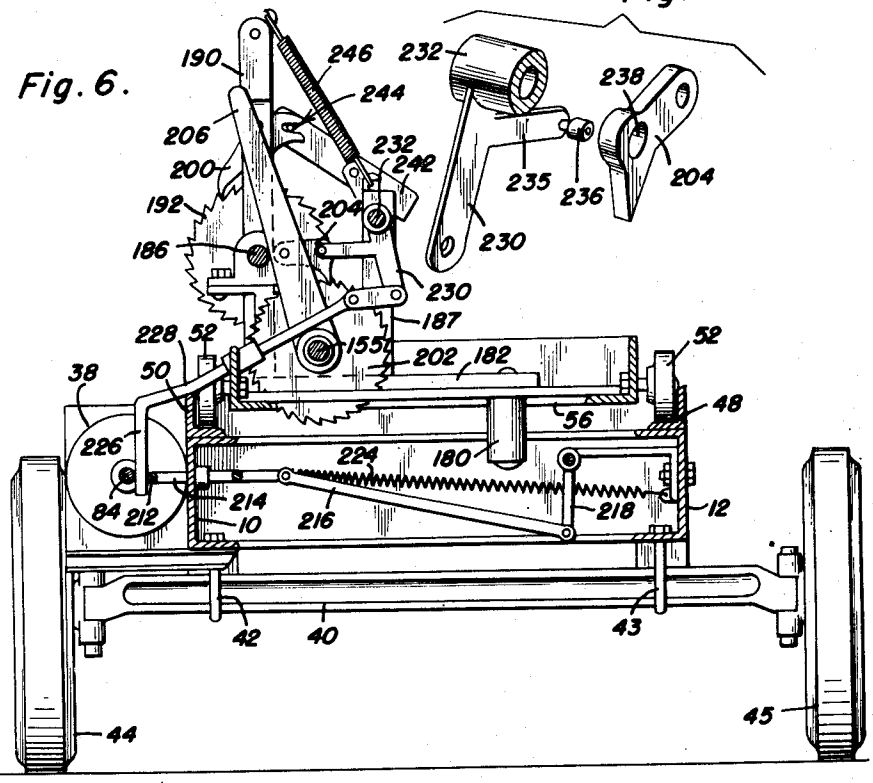
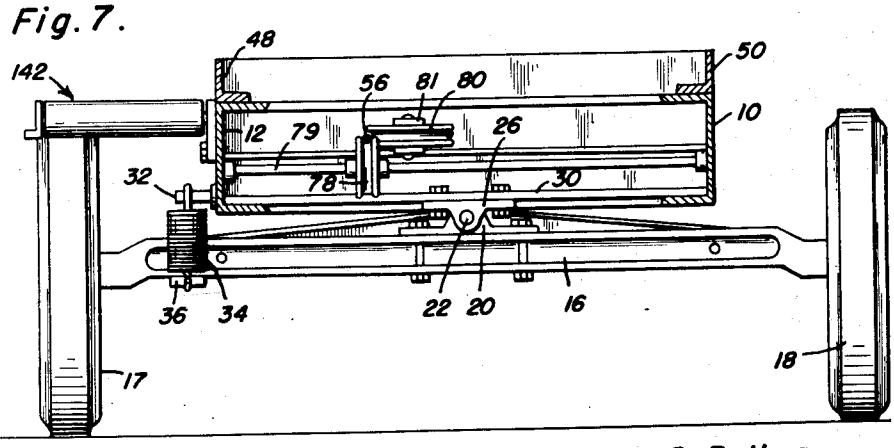


Fig. 7.



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UNITED STATES PATENT OFFICE

2,664,928

AUTOMATIC PORTABLE SAWMILL

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Application December 21, 1949, Serial No. 134,195

2 Claims. (Cl. 143—115)

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This invention relates to novel and useful improvements in power saws.

An object of this invention is to cut a work piece, as a log, by means of a rotary saw which is carried on a frame by holding the work piece by a dog which is carried by a knee which is movable transversely of the plane of the saw for adjustment and said knee being carried by a head block which lies transversely of the carriage which is operable on the frame for movement parallel to the plane of the saw, whereby a work piece clamped and held is cut as the knee moves longitudinally of the frame.

Another object of this invention is to automatically reset the knee and hence the work piece which is disposed on the head block in response to movement of the carriage on the frame, said movement occasioning a cam follower to be operated, which in turn, through a series of gears and shafts, moves the knee an increment transverse to the longitudinal axis of the frame.

A further object of this invention is to automatically set or reset the work piece holding mechanism as above detailed but to oppose the operation of the knee by a resilient device as a spring, whereby, when the spring is caused to exert its force in such a manner as to cause actuation of the knee, the knee is returned to an initial setting or starting condition.

Another object of the invention is to provide a manually, either foot or hand, operated device for releasing the spring and allowing it to return the knee, this manually operable device being normally located in a position whereby it will be ineffectual to cause this operation, but movable to such position as to render the desired results.

A still further object of this invention is to operate the carriage in one direction or the other in accordance with the prerogative of the user of the device by means of displacing a friction wheel so that it will engage one or the other of a pair of pulleys, said pulleys being connected with a drum which has a cable wound thereon and the cable being secured to the carriage so that the carriage is pulled positively in one direction or the other.

Another object of this invention is to automatically cut a work piece, as, for example, a log, in selected widths, the set of the device being arranged for adjustment by a simple manipulation of a single cam, eliminating the necessity of a person setting, as by a screw, the saw to bring about desired widths of cut. By this expedient, errors due to human judgment are eliminated.

Ancillary objects and features of novelty will

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become apparent in following the description of the illustrated form of the invention.

In the drawings:

Figure 1 is a plan view showing one-half of the machine;

Figure 1*a* is a plan view showing the other half of the machine so that when Figures 1 and 1*a* are joined, the complete device is shown in plan view;

Figure 2 is a sectional view taken substantially on the line 2—2 of Figure 1 and in the direction of the arrows;

Figure 3 is a sectional view taken substantially on the line 3—3 of Figure 1 and in the direction of the arrows, showing particularly the construction of the knee and carriage as well as a part of the means of operating the knee and returning the knee;

Figure 4 is a sectional view taken substantially on the line 4—4 of Figure 1*a* and in the direction of the arrows;

Figure 5 (sheet 3) is a perspective view of a portion of the means for operating the knee and returning the platform;

Figure 6 is a sectional view taken substantially on the line 6—6 of Figure 3 and in the direction of the arrows;

Figure 7 is a sectional view taken substantially on the line 7—7 of Figure 1*a* and in the direction of the arrows; and

Figure 8 is a fragmentary perspective view showing in exploded detail a ratchet dog and a means for operating the dog which is employed in connection with holding the knee moving device in an adjusted position.

The main frame of the machine may contain various supports and strengthening elements. In Figures 1 and 1*a*, sufficient structural members are shown to form a bed for the various elements which cooperate to form the necessary structure in carrying out the desired operation of the device. There is a pair of longitudinal, parallel channel members 10 and 12 which are held in fixed spaced relationship by means of a cross member 13 at the front of the frame and a cross member 14 at the rear of the frame. A number of other cross members are employed, which will be identified subsequently. An axle 16 extends transversely of the upper part of the frame and has wheels 17 and 18 at the ends thereof. The axle has a pillow block 20 intermediate its ends through which a pivot pin 22 passes (Figure 2). This pivot pin also passes through a boss 26 which is secured to the cross member 28 and which is also secured to the cross member 30. The bosses may be individual or a single one connected with

the cross members 28 and 30. By this construction, the frame is capable of pivotal movement about its longitudinal axis which passes through the pivot pin 22. A lug 32 extends from the side of the channel 12 and has a spring 34 secured thereto. The lower end of the spring is secured to a bracket 36 (Fig. 7) which is fixed to the axle. Inasmuch as a motor schematically shown at 38 (Fig. 1) is secured to the opposite end of the frame and on the opposite side thereof, the tendency for the frame is to rotate pivotally by the weight of the motor or engine 38. However, this rotation is practically prevented by the spring 34. If necessary, more than one spring 34 may be employed as disclosed in Figure 1a.

An axle 40 is connected with the frame by means of U-bolts 42 and 43 (Fig. 6) and has wheels 44 and 45 at the ends thereof to complete the support for the frame. Steering linkage partially shown in Figure 1 illustrates that these wheels may be turned by means of a drawbar or other equivalent.

Angle iron members 48 and 50 are welded to the channels 10 and 12 and form rails for the rollers 52 which are supported on axles, said axles and rollers forming a part of a carriage which is parallel to the longitudinal axis of the frame. This carriage includes a base 54 which supports a number of elements to be detailed subsequently. There is a means for rolling the carriage in a reciprocatory manner on the rails 48 and 50. The preferable means consists of a cable 56 which is attached at its ends to the base 54 of the carriage. Any suitable means of forming the base may be arrived at, as the parallel side members 58 and 60 held by spacing members 61 (Figure 1). If found desirable, a solid sheet metal base may be employed, this being a matter of choice.

The cable is attached at both ends to the carriage and is guided around an idler pulley 62 carried in a bracket 64. The bracket 64 is fixed to the cross member 13 at one end of the frame. The cable extends over an idler pulley 66 (Fig. 1a) which is secured on a shaft 68 extending transversely of the channels. The cable then is entrained around a drum 70 which is disposed on a shaft 72. The shaft 72 is mounted in a swivel bearing assembly which includes a boss 74 disposed on a plate 75, which plate is pivoted by means of the pin 76 to the channel 12. The cable 56 then continues over another idler pulley 78 which is disposed on a shaft 79 extending between the channels 10 and 12. After being guided by the pulley 78, the cable is entrained around another idler pulley 80, which is carried by a bracket 81. This bracket is welded or otherwise rigidly fixed to the cross member 14. The cable 56 then continues for its connection with one of the cross members 61 of the carriage.

The motor or engine 38 has a drive shaft 84 actuated thereby which is coupled with the engine by means of a universal joint 86. A support 87 is supplied intermediate the ends of the drive shaft 84 and is rigidly fixed to one of the channels. Another universal joint 88 connects the shaft 84 with a conventional differential 90, the housing of which is bolted or otherwise rigidly fixed to one of the channels. A driven shaft 91 is mounted at one end in a bearing 92. This bearing is fixed to the channel 12. An additional bearing 93 is disposed on a frame cross member 94 which extends from the channel 10 to the channel 12 and which is rigidly fixed to each channel. A differential shaft 95 extends from the differential and is connected with the driven shaft 91 by means of a universal joint 96. Therefore, upon operation of the motor or engine 38, torque is imparted to the differential shaft 95 and the driven shaft 91 which operates the saw blade 97 disposed on the outside of the channel 12.

A gear 98 is fixed to the differential shaft 95 and is disposed between the channels 10 and 12. This gear has a chain 99 entrained therearound. Reference to Figure 4 shows the travel of the chain.

A sprocket 100 mounted on a shaft 101 which is, in turn, mounted on a hanger 102, is supplied. This sprocket engages the chain 99, holding a part of it downward and pressing another part of it against the sprocket 105. The sprocket 105 is suspended by a hanger 106 and there is a shaft 107 disposed in the hanger. Ultimately, the chain 99 extends around a sprocket 110 which is fixed to a shaft 112, said shaft being carried in a bearing on the channel 12. Therefore, when the motor or engine is operated, the various shafts will be rendered operative. The shaft 107 is fixed to the sprocket 105, while the shaft 112 is fixed to the sprocket 110. Due to the way that the chain is entrained around the sprockets 105 and 110, the shafts 101 and 112 will be operated in the same direction. A pulley 114 is fixed to the shaft 101, and a pulley 116 is fixed to the shaft 112. A friction wheel 118 (Fig. 1a) is secured to the drum 70 and to the shaft 72. The friction wheel shaft, and the drum shaft 72 are carried by means of a hanger bracket 120 mounted at its upper end on a pivot pin 122. The pivot pin is fastened to the channel 10. A link 124 is secured to the hanger 120 in order to swing the hanger so that the friction wheel 118 engages either the pulley 114 or the pulley 116 in order to impart either clockwise or counterclockwise rotation to the drum 70. This will wind the cable 56 in one direction or the other on the drum. Accordingly, inasmuch as the cable is fixed to the carriage, the carriage will move in one direction or the other depending on which drum is engaged by the friction wheel 118. When the hanger 120 is disposed in such position so that the friction wheel 118 engages neither the drum 116 nor the drum 114, no operation of the carriage is obtained.

In order to actuate the link 124, a bellcrank 128 is pivoted intermediate its ends on a bracket 130 (Fig. 4). The link 124 is secured to one end of the bellcrank 128 and the opposite end of the bellcrank has a pitman 132 secured thereto. The pitman is also secured to a hand-operating lever 134 carried by the bracket 136. The bracket 136 is welded or otherwise rigidly fixed to the channel 12 locating the handle 134 in convenient position for operation.

The means of operating the carriage by moving the handle 134 should be apparent from the foregoing.

The frame contains various accommodations for elements, as the bracket (Figure 3) 140 for a battery to be used when an internal combustion engine is used which is represented by the schematic showing at 38. A saw platform 141 (Fig. 1a) is fixed to the channel 12 and, in part, forms a saw guide for the blade 97. A roller type conveyor, generally indicated at 142, is secured to the channel 12 in advance of the guard 141 and is used to receive the cut boards after the operation on the work piece by the saw blade 97.

Forming a part of the carriage are the end cross members 144 and 146 which also serve as rails for the knees which are disposed on the carriage and which constitute head blocks. The knees include a pair of base members disposed on the members 144 and 146. A rack 151 (Fig. 3) is formed on the under surface of the base member 148 and a rack 152 is formed on the under surface of the base member 150. The use of the racks is for deriving motive force from the pinions 153 and 154 which are fixed to the shaft 155. The actuation of the knee is transverse with respect to the movement of the carriage and also transverse of the longitudinal axis of the frame. The base members 150 and 148 of the knee have upstanding portions 156 and 158 on which the jack standards 159 and 160 respectively are secured. Manually operable jack elements 162 and 164 are operable on the members 159 and 160 so as to press the dogs 166 (Figure 2) into the work piece and to hold it firmly on the headblocks 144 and 146. Therefore, after a log or the like is fastened firmly by means of the dogs 166 which are formed on the jack elements when movement of the knee occurs, similar or corresponding movement of the work piece occurs laterally with respect to the longitudinal axis of the frame.

Means for moving the knee on the head block transversely of the longitudinal axis of the frame is provided. This means consists of a cam 170 (Fig. 5) which is pivoted to the cross member 171 of the frame. The cam has an arm 172 forming a part of an operator for displacing the cam for adjustment. The arm 172 is secured to an operating handle 174 (Figs. 1 and 2) which is carried in a suitable bracket 176. This bracket is fixed to the channel 12 and is operable in a locking quadrant gear 178 which is also fixed to the channel 12. Therefore, when the handle 174 is operated, this actuation will be reflected directly in adjustment of the cam 170.

A cam follower (Figure 5 and Figure 6) 180 is fixed to an arm 182 which is adapted to be reciprocated in accordance with the movement or travel of the carriage on the frame.

Referring to Figure 3, a support is supplied for various locking and operating members of the knee. This support consists of a standard 184 which is welded or otherwise rigidly fixed to the carriage and which mounts the shaft 186 for rotation. Supports 187 and 188 connected by a cross member 189 are also employed for helping to support the shaft 186.

A yoke (Figure 5) 190 is mounted for swinging movement on the shaft 186 and the legs of the yoke are disposed on opposite sides of the gear 192. This gear is fixed to the shaft 186 for rotation therewith. Another gear 194 is fixed to the shaft 186 and engages a smaller gear 196. This smaller gear is carried on a shaft 155 which is disposed in suitable bearings on the platform. The pinions 154 and 153 (Fig. 3) are fixed to the shaft 155 and they engage the rack gears 151 and 152. Rotation of the shaft 186 is translated to movement of the knee on the head block in the described manner.

When the carriage moves past the cam 170, the cam follower 180 engages the cam, thereby rocking the yoke 190. At this time the dog or pawl 200 which is pivoted between the legs of the yoke engages between a pair of teeth of the gear 192, thereby rotating it an amount. This rotation is imparted through the gears 194, 196, 154, and 153 to the racks at the bottom of the knee, thereby causing it to be moved an increment toward the plane of the saw. After rotation of the gear 192, the dog 200 falls between another pair of teeth, thereby holding it. Inasmuch as the shaft 155 rotates to cause transverse movement of the knee, the gear 202 which is fixed thereto is also rotated. The dog 204 which is pivoted to the yoke 206 engages between the teeth thereof, holding it so that it, together with the shaft 155 will not return.

Means opposing the operation of the shaft 155 is supplied. The preferable means consists of a spring 208 which is concentrically arranged on the shaft 155 and which has one end fixed to a part of the carriage base 54. The other end of the spring 208 is fixed to the shaft 155 by means of a coupling 210 whereby the spring reacts on the carriage.

The yoke 206 is mounted for free swinging movement on the shaft 155. However, it is pressed against the cross member 189 by the reaction of the dog 204 operating in the teeth of the gear 202.

Means for releasing the dog 204 as well as the dog 200 to allow the spring 208 to return the carriage is supplied. This means consists of an operator 212 which is disposed on the outside of the channel 10. This operator is, in effect, a cam having a number of arms 214 projecting therefrom. These arms pass through openings formed in the channel 10 whereby it is guided in its movement. A link 216 (Figure 2) is secured to one of the guide arms 214 and has a crank 218 operatively connected therewith. This crank is carried by brackets 220 (Fig. 1) which are suitably secured to the frame. A foot pedal 222 is secured to the crank 218 so that upon operation of the pedal, the operator 212 is urged outwardly of the frame. This actuation is opposed by springs 224 (Fig. 6) which are secured to the operator and to the opposite channel. Therefore, when the foot pedal is depressed the operator 212 is urged outwardly against the opposing force of the springs 224. When the foot pedal is released, the springs 224 pull the operator inwardly.

When the operator is in the outward or operative position and the carriage passes by the operator, a finger 226 which is at the end of a link 228 engages the operator, thereby rotating the crank 230 which is pivoted to a part of the support. One end of the crank is secured to the link 228, the intermediate portion is pivoted, and the other end is fixed to a shaft 232. An arm 235 extends from the shaft 232 (Figure 8) and has a finger 236 protruding therefrom. This finger engages in an aperture 238 in the dog 204, pivoting the dog so that it is separated from the teeth of the gear 202. This will allow the spring 208 to expend its stored energy to return the platform.

However, at this time the cam 240 which is fixed to the shaft 232 raises an arm 242 (Figure 2) which is pivoted to a part of the support, causing the dog 200 to be disengaged from the teeth of the gear 192. A pin and slot connection, generally indicated at 244, connects the arm 242 with the dog 200. By disengagement of the dog 200 from within the teeth of the gear 192, the spring 246, which reacts on the yoke 190 and a part of the support, causes the yoke to be returned to the initial condition.

The operation of this portion of the device is as follows: As the carriage moves from one end of the frame to the other, the cam follower 180 engages the cam 170 and causes the knee to

move transversely of the frame and towards the plane of the saw a predetermined amount. This amount is governed by adjusting the disposition of the cam 170. When the carriage is returned, the cam follower 180 again engages the cam 170 and causes another operational movement of the knees the same amount. This is the full adjusted amount for cutting one board from a work piece.

Inasmuch as the operator 212 is normally maintained in such position that it is inoperative, the carriage may be reciprocated any number of times to cut any number of boards from a work piece until the work piece is exhausted. After the last board has been cut from this work piece, the foot operator 222 is actuated, thereby pressing the operator 212 outwardly so that the finger 226 engages it in order to release the various dogs to allow the carriage to move to its initial or starting position.

At this time another log may be placed on the head blocks and the device set in motion again.

From the foregoing, an understanding of the structure and operation of one form of the invention is deemed manifest.

Having described the invention, what is claimed as new is:

1. In a power saw, a frame, a saw blade mounted on said frame in a plane parallel to the longitudinal axis of said frame, a carriage disposed on said frame and movable longitudinally of said frame, a pair of transverse rails forming a part of said carriage and constituting head blocks, knees including base members located on said rails and movable tranversely of said carriage, each said knee including a dog to hold a log on its respective head block, means for raising said dog and holding said dog in a clamping position against the log, a gear assembly connected to said knee base members and forming means for actuating said knee on said head block to move the log laterally of said carriage, said last mentioned means including a cam follower which is located below and between said knee base members, means carried by said frame for actuating said cam follower when said carriage is moved fore and aft on said frame, said cam follower actuating means including a cam, and means adjustably mounting said cam in the path of travel of said cam follower, said mounting means including a cross member carried by said frame, a vertical pivot pin connecting said cam to said cross-member, a link connected to said cam, and means carried by said frame and connected to said link for moving said cam transversely in the path of travel of said cam follower to effect selectively adjustable movement of the log laterally of said carriage as the latter is moved fore and aft on said frame.

2. The combination of claim 1, and said cam moving means including a crank pivoted intermediate it ends on said frame and connected at one end to said link, the other end of said crank being selectively engageable with a graduated locking device to lock said cam in selected positions in the path of movement of said cam follower.

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